Notes on lubrication

⚠ If using a progressive lubrication system, with grease lubrication, please pay attention to the minimum dosing amount for relubrication stated in table 9.

⚠ We recommend carrying out initial lubrication separately using a grease gun before connecting to the central lubrication system.
If using a central lubrication system, you must make sure that all the pipes and elements are filled with lubricant and do not contain any air pockets until they are connected to the consumer (ball runner block).
The number of pulses results from the partial amounts and the piston distributor size.

- **With fluid grease lubrication according to table 9**
- **With oil lubrication according to table 14**

⚠ The seals on the ball runner block must be oiled or greased with the respective lubricant before installation.

⚠ If you use different lubricants than the ones stated, you may find that relubrication intervals are shorter and that performance decreases with short stroke and load ratio; in addition, chemical interactions can take place between the plastics, lubricants and the preservative agents. In addition, pumpability in single-line central lubrication systems must be guaranteed.

⚠ Pumping or storage tanks for the lubricant must be fitted with a stirrer to guarantee the flow of lubricant (to avoid funneling in the tank).

⚠ You must not use lubricants containing solid lubricating components (like graphite and MoS_2 for example)!

⚠ In the case of basic lubrication at the factory, grease and oil lubrication are possible.
In the case of re, it is not possible to change from grease to oil lubrication.

⚠ You must lubricate ball runner blocks without lubrication at the factory before commissioning.

⚠ When applying lubricant at the start or after a relatively long standstill, carry out two to five lubrication pulses in succession. When the system is in operation, 3 to 4 pulses per hour are recommended, irrespective of the distance traveled. If possible, carry out lubrication in one lubricating stroke. Carry out cleaning cycles (see “Maintenance”).

⚠ In the case of environmental influences such as contamination, vibration, jolting, etc., we recommend shortening the relubrication intervals appropriately. Even under normal operating conditions, the system must be relubricated at the latest after 2 years due to aging of the grease.

If your application involves more demanding environmental requirements (such as clean room, vacuum, food industry applications, increased exposure to fluids or aggressive media, extreme temperatures), please consult us. Each application must be considered on its own merits in order to chose the most appropriate lubricant. Be sure to have all the information concerning your application at hand when contacting us.

Rexroth recommends piston distributors manufactured by SKF. These should be installed as close as possible to the lube ports of the ball runner blocks. Long lines and small line diameters should be avoided, and the lines should be laid on an upward slant. Install the lines at a gradient.

Refer to the chapter entitled “Ball runner block accessories” for a selection of possible lube ports (in this connection, contact the manufacturer of your lubrication system too).

If other consumers are connected to the single-line centralized lubrication system, the weakest link in the chain will determine the lubrication cycle time.

For the “Dynalub” product and material safety data sheet, visit our Web page www.boschrexroth.de/brl

Notes on Dynalub

⚠ Pay attention to the assignment of the ball rail system

Under conventional environmental conditions this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements:

- With loads up to 50 % C
- With short-stroke applications > 1 mm
- For the permissible speed range of ball rail systems

The product and material safety data sheet is available on our Web page at www.boschrexroth.de/brl.

Dynalub 510
Grease type
Properties:

- Lithium-based, high-performance grease of NLGI grade 2 according to DIN 51818 (KP2K-20 according to DIN 51825)
- Good water resistance
- Corrosion protection
- Temperature range: -20 to +80 °C

Material numbers for Dynalub 510:

- R3416 037 00 (cartridge 400 g)
- R3416 035 00 (hobbock 25 kg)

Alternative greases:

- Castrol Longtime PD2
- Elkalub GLS 135/N2

Dynalub 520
Liquid grease
Properties:

- Lithium-based, high-performance grease of NLGI grade 00 according to DIN 51818 (GP00K-20 according to DIN 51826)
- Good water resistance
- Corrosion protection
- Temperature range: -20 to +80 °C

Material numbers for Dynalub 520:

- R3416 043 00 (cartridge 400 g)
- R3416 042 00 (bucket 5 kg)

Alternative greases:

- Castrol Longtime PD00
- Elkalub GLS 135/N00

Notes on lubricant oil

We recommend **Shell Tonna S3 M 220** or similar products with the following properties:

- Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
- A blend of highly refined mineral oils and additives
- Can be used even when mixed with significant quantities of metalworking fluids

Lubrication

Lubrication using a grease gun or a progressive feeder system

⚠ Pay attention to the “Note on lubrication” chapter: We recommend **Dynalub 510.** For more information, refer to the “Note on lubrication” chapter.

⚠ Never commission ball runner blocks without having carried out basic lubrication on them. In the case of pre-lubrication at the factory initial lubrication is not necessary. Rexroth ball rail systems are delivered preserved.

Initial lubrication of the ball runner blocks (basic lubrication)
Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- Attach one lube port per ball runner block on the left-hand **or** the right-hand side and lubricate it!

Initial lubrication is applied in three partial quantities as specified in table 1:

1. Grease the ball runner block with the first partial quantity as per table 1, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (normal stroke)				
	Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm^3)				
15	0.4 (3x)		Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)				
25	1.4 (3x)				
30	2.2 (3x)				
35	2.2 (3x)				
45	–				
55	9.4 (3x)		–		
65	15.4 (3x)				
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)		–		

Table 1

Stroke < 2 · ball runner block length B_1 (short stroke)

- Attach two lube ports per ball runner block; one each on the left-hand **and** the right-hand side and lubricate them!

Initial lubrication is applied to each fitting in three partial quantities as specified in table 2:

1. Grease each fitting on the ball runner block with the first partial quantity as per table 2, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (short stroke)				
	Material number (not pre-lubricated)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm^3) left	right			
15	0.4 (3x)	0.4 (3x)	Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)	0.7 (3x)			
25	1.4 (3x)	1.4 (3x)			
30	2.2 (3x)	2.2 (3x)			
35	2.2 (3x)	2.2 (3x)			
45	–				
55	9.4 (3x)	9.4 (3x)	–		
65	15.4 (3x)	15.4 (3x)			
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)	2.7 (3x)	–		

Table 2

Lubrication using a grease gun or a progressive feeder system (continued)

Relubrication of runner blocks

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- If the relubrication interval according to diagram 1 or 2 has been reached, insert the relubrication amount in accordance with table 3.

Size	Relubrication (normal stroke)				
	Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm³)		Partial amount (cm³)		
15	0.4 (1x)		0.4 (2x)		
20	0.7 (1x)		0.7 (2x)		
25	1.4 (1x)		1.4 (2x)		
30	2.2 (1x)		2.2 (2x)		
35	2.2 (1x)		2.2 (2x)		
45	–		4.7 (2x)		
55	9.4 (1x)		–		
65	15.4 (1x)				
20/40	–		1.0 (2x)		
25/70			1.4 (2x)		
35/90	2.7 (1x)		–		

Table 3

Stroke < 2 ball runner block length B_1 (short stroke)

- If the relubrication interval according to diagram 1 or 2 has been reached, insert the relubrication amount in accordance with table 4 **per** lube port.
- Per lubrication cycle, the ball runner block should be run with a double stroke of 3 · ball runner block length B_1; however, the minimum stroke must be ball runner block length B_1.

Size	Relubrication (short stroke)				
	Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm³)		Partial amount per port (cm³)		
	left	right	left	right	
15	0.4 (1x)	0.4 (1x)	0.4 (2x)	0.4 (2x)	
20	0.7 (1x)	0.7 (1x)	0.7 (2x)	0.7 (2x)	
25	1.4 (1x)	1.4 (1x)	1.4 (2x)	1.4 (2x)	
30	2.2 (1x)	2.2 (1x)	2.2 (2x)	2.2 (2x)	
35	2.2 (1x)	2.2 (1x)	2.2 (2x)	2.2 (2x)	
45	–		4.7 (2x)	4.7 (2x)	
55	9.4 (1x)	9.4 (1x)	–		
65	15.4 (1x)	15.4 (1x)			
20/40	–		1.0 (2x)	1.0 (2x)	
25/70			1.4 (2x)	1.4 (2x)	
35/90	2.7 (1x)	2.7 (1x)	–		

Table 4

Lubrication

Load-dependent relubrication intervals for grease lubrication using grease guns or progressive feeder systems (“dry axes”)

The following conditions apply:

- Grease lubricant Dynalub 510 or alternatively Castrol Longtime PD 2
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature:
  T = 20 – 30 °C

Key

C	= Dynamic load capacity	(N)
F_{comb}	= Dynamically combined equivalent load	(N)
F_{comb}/C	= Load ratio	(–)
s	= Relubrication interval as running distance	(km)

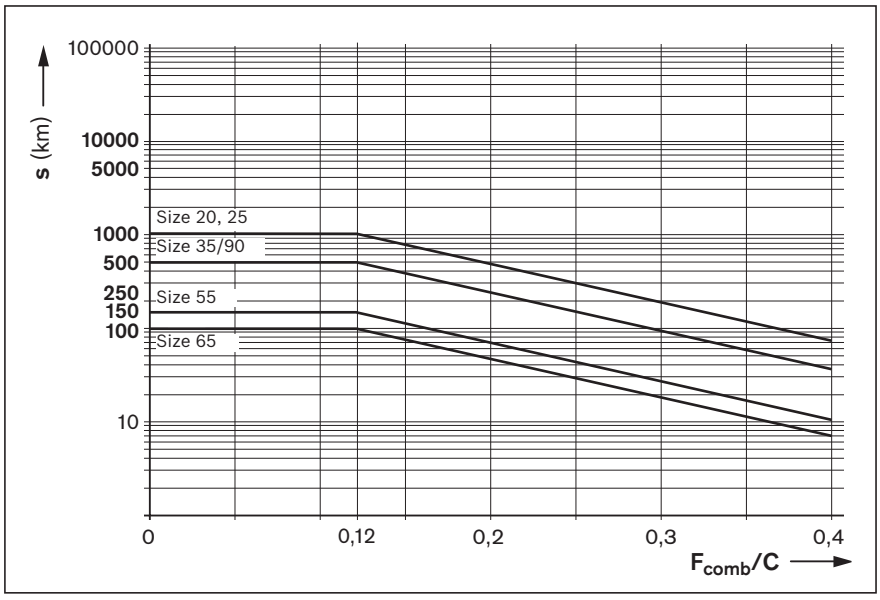
Definition of F_{comb}/C

The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

Please consult us regarding the relubrication intervals in the following cases:

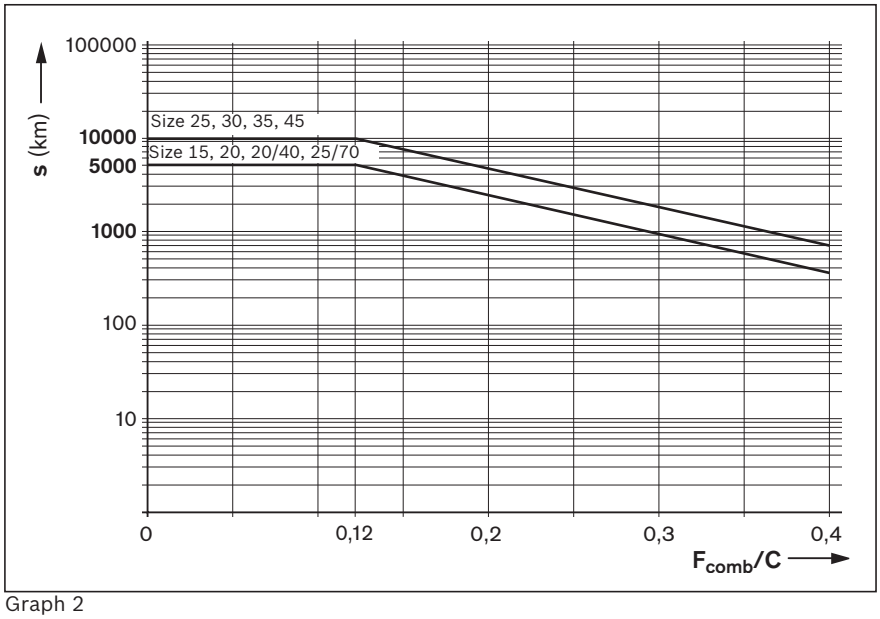
- exposure to metalworking fluids
- with dust coverage (wood, paper, etc.)
- use of double-lipped seals (DS)
- use of standard seals (SS) in combination with end seals or FKM seals or seal kits

⚠ Pay attention to the notes on lubrication!



Graph 1

Material number		
R16.. ... 10	**R16.. ... 11**	**R16.. ... 60**



Graph 2

Material number				
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**R20.. ... 90**
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**	
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**	

Liquid grease lubrication via single-line piston distributor systems

Fluid grease: We recommend **Dynalub 520**

⚠ Never commission ball runner blocks without having carried out basic lubrication on them. In the case of pre-lubrication at the factory initial lubrication is not necessary. Rexroth ball rail systems are delivered preserved.

Initial lubrication of the ball runner blocks (basic lubrication)
Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- Attach one lube port per ball runner block on the left-hand **or** the right-hand side and lubricate it!

Initial lubrication is applied in three partial quantities as specified in table 5:

1. Grease the ball runner block with the first partial quantity as per table 5, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (normal stroke)				
	Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm³)				
15	0.4 (3x)		Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)				
25	1.4 (3x)				
30	2.2 (3x)				
35	2.2 (3x)				
45	–				
55	9.4 (3x)		–		
65	15.4 (3x)				
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)		–		

Table 5

Stroke < 2 · ball runner block length B_1 (short stroke)

- Attach two lube ports per ball runner block; one each on the left-hand **and** the right-hand side and lubricate them!

Initial lubrication is carried out three times per port using the partial amount stated in table 6:

1. Grease each fitting on the ball runner block with the first partial quantity as per table 6, pressing it in slowly with the help of a grease gun.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (short stroke)				
	Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm³)				
	left	right			
15	0.4 (3x)	0.4 (3x)	Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (3x)	0.7 (3x)			
25	1.4 (3x)	1.4 (3x)			
30	2.2 (3x)	2.2 (3x)			
35	2.2 (3x)	2.2 (3x)			
45	–				
55	9.4 (3x)	9.4 (3x)	–		
65	15.4 (3x)	15.4 (3x)			
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	2.7 (3x)	2.7 (3x)	–		

Table 6

Lubrication

Relubrication of runner blocks

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- If the relubrication interval according to diagram 3 or 4 has been reached, insert the relubrication amount in accordance with table 7.

Note

The necessary number of pulses is the integer quotient from the minimum relubrication amount according to table 7 and the smallest permissible piston distributor size (≙ minimum number of pulses) according to table 9.
The smallest permissible piston distributor size also depends on the mounting orientation.
The lubrication cycle results from dividing the relubrication interval
by the determined number of pulses (c.f. the rating example).

Size	Relubrication (normal stroke)				
	Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm³)		Partial amount (cm³)		
15	0.4 (1x)		0.4 (2x)		
20	0.7 (1x)		0.7 (2x)		
25	1.4 (1x)		1.4 (2x)		
30	2.2 (1x)		2.2 (2x)		
35	2.2 (1x)		2.2 (2x)		
45	–		4.7 (2x)		
55	9.4 (1x)		–		
65	15.4 (1x)				
20/40	–		1.0 (2x)		
25/70			1.4 (2x)		
35/90	2.7 (1x)		–		

Table 7

Stroke < 2 · ball runner block length B_1 (short stroke)

- If the relubrication interval according to diagram 3 or 4 has been reached, insert the relubrication amount in accordance with table 8 **per** lube port.
- Calculate the required pulse count and lubricant cycle time in the same way as for relubrication (normal stroke).
- Per lubrication cycle, the ball runner block should be run with a double stroke of 3 · ball runner block length B_1; however, the minimum stroke must be ball runner block length B_1.

Size	Relubrication (short stroke)				
	Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm³)		Partial amount per port (cm³)		
	left	right	left	right	
15	0.4 (1x)	0.4 (1x)	0.4 (2x)	0.4 (2x)	
20	0.7 (1x)	0.7 (1x)	0.7 (2x)	0.7 (2x)	
25	1.4 (1x)	1.4 (1x)	1.4 (2x)	1.4 (2x)	
30	2.2 (1x)	2.2 (1x)	2.2 (2x)	2.2 (2x)	
35	2.2 (1x)	2.2 (1x)	2.2 (2x)	2.2 (2x)	
45	–		4.7 (2x)	4.7 (2x)	
55	9.4 (1x)	9.4 (1x)	–		
65	15.4 (1x)	15.4 (1x)			
20/40	–		1.0 (2x)	1.0 (2x)	
25/70			1.4 (2x)	1.4 (2x)	
35/90	2.7 (1x)	2.7 (1x)	–		

Table 8

⚠ Pay attention to the notes on lubrication!

Liquid grease lubrication via single-line piston distributor systems (continued)

Load-dependent relubrication intervals for liquid grease lubrication via single-line piston distributor systems (“dry axes”)

The following conditions apply:

- Liquid grease Dynalub 520 or alternatively Castrol Longtime PD 00
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature:
  T = 20 – 30 °C

Key

C = Dynamic load capacity (N)
F_{comb} = Dynamically combined equivalent load (N)
F_{comb}/C = Load ratio (–)
s = Relubrication interval as running distance (km)

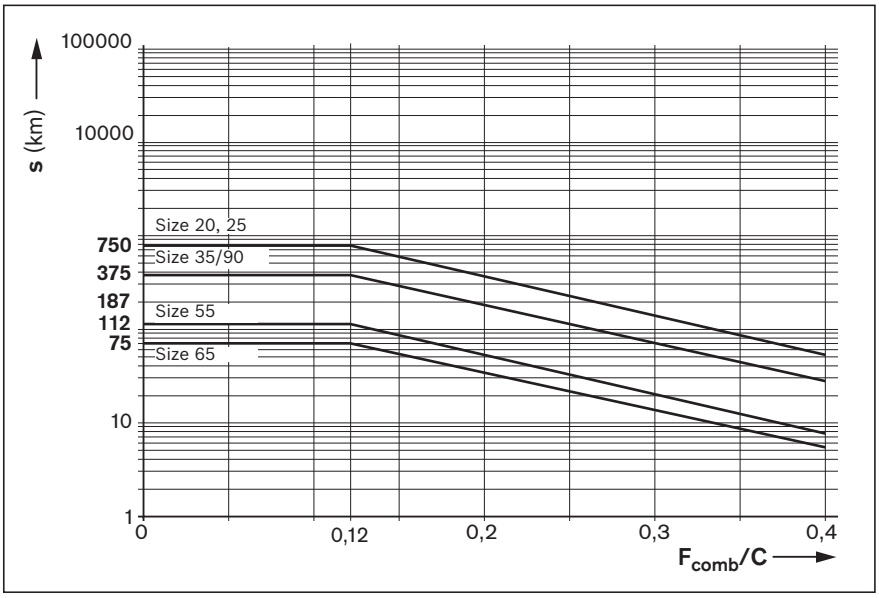
Definition of F_{comb}/C

The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

Please consult us regarding the relubrication intervals in the following cases:

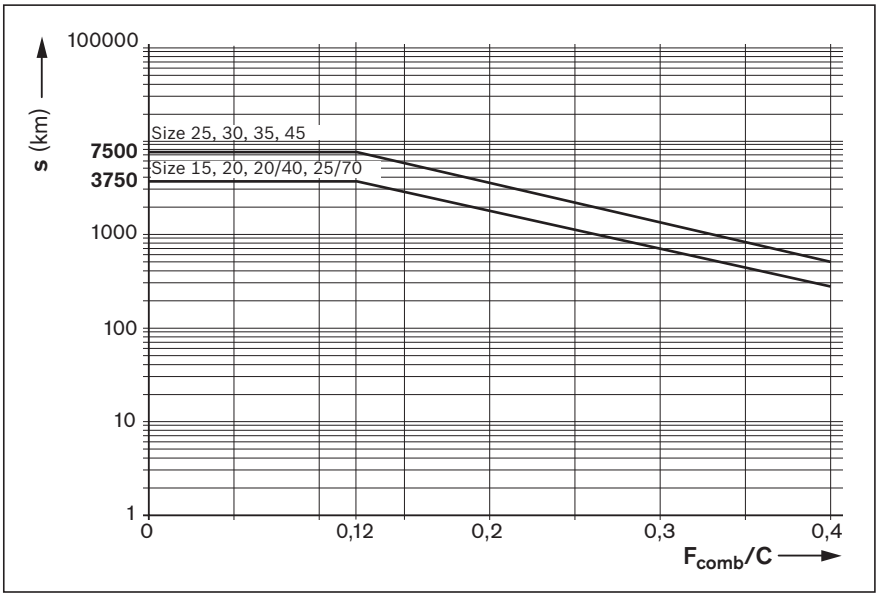
- exposure to metalworking fluids
- with dust coverage (wood, paper, etc.)
- use of double-lipped seals (DS)
- use of standard seals (SS) in combination with end seals or FKM seals or seal kits

⚠ Pay attention to the notes on lubrication!



Graph 3

Material number		
R16.. ... 10	**R16.. ... 11**	**R16.. ... 60**



Graph 4

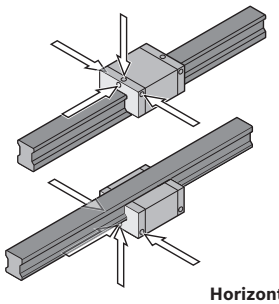
Material number				
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**R20.. ... 90**
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**	
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**	

Lubrication

Mounting orientation I – normal stroke

Horizontal

1 lube port can be used on a ball bearing guide on the left **or** on the right

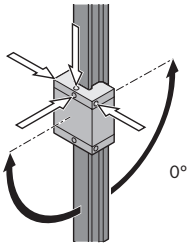


Horizontal, top-down
Same port

Mounting orientation II – normal stroke

Vertical to inclined horizontal

1 lube port at top end cap

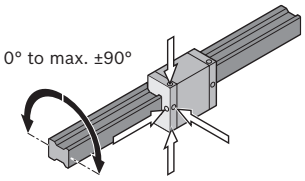


Vertical to inclined horizontal, top-down
Same port

Mounting orientation III – normal stroke

Wall mounting

1 lube port can be used on a ball bearing guide on the left **or** on the right

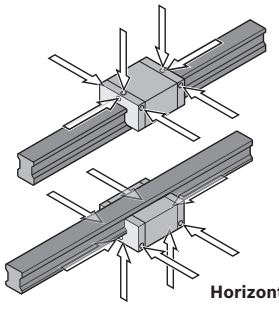


Same port

Mounting orientation IV – short stroke

Horizontal

2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one

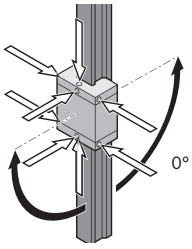


Horizontal, top-down
Same ports

Mounting orientation V – short stroke

Vertical to inclined horizontal

2 lube ports with one port each on the top ball bearing guide **and** on the bottom one

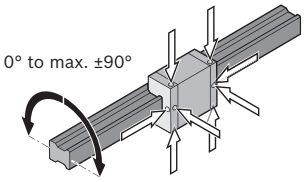


Vertical to inclined horizontal, top-down
Same ports

Mounting orientation VI – short stroke

Wall mounting

2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



Same ports

Smallest permissible piston distributor sizes for fluid grease lubrication via single-line consumption lubrication systems[1)]

Ball runner block					**Smallest permissible piston distributor size (≙ minimum number of pulses) per port** (cm^3) **with fluid grease of NLGI grade 00**										
					Size										
Material number				**Part number**	**15**	**20**	**25**	**30**	**35**	**45**	**55**	**65**	**20/40**	**25/70**	**35/90**
R16.. ... 10 **R16.. ... 11** **R16.. ... 60**				**Horizontal I, IV** **Vertical II, V** **Wall mount. III, VI**	–	0.30	0.30	–	–	–	0.30	0.30	–	–	0.30
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**Horizontal I, IV**	0.03	0.03	0.03	0.06	010	0.10	–		0.03	0.03	–
R20.. ... 0Z	**R16.. ... 2Z**	**R20.. ... 3Z**	**R16.. ... 7Z**	**Vertical II, V**											
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	**Wall mount. III, VI**		0.06	0.06	0.10	0.20	0.20			0.06	0.06	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**												
R20.. ... 0Y	**R16.. ... 2Y**	**R20.. ... 3Y**	**R16.. ... 7Y**												
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**												
		R20.. ... 90													

Table 9

1) The following conditions apply:
- Fluid grease Dynalub 520 (or alternatively Castrol Longtime PD 00) and piston distributor made by SKF
- Lubrication channels must be filled
- Ambient temperature T = 20 – 30 °C

Oil lubrication via single-line piston distributor systems
Oil lubricant

We recommend **Shell Tonna S3 M220** with the following properties:

- Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
- A blend of highly refined mineral oils and additives
- Can also be used if intensely mixed with coolants/lubricants.

⚠ Pay attention to the notes on lubrication!

⚠ Never commission ball runner blocks without having carried out basic lubrication on them. In the case of pre-lubrication at the factory initial lubrication is not necessary. Rexroth ball rail systems are delivered preserved.

Initial lubrication of the ball runner blocks (basic lubrication)

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- Attach one lube port per ball runner block on the left-hand **or** the right-hand side and lubricate it!

Initial lubrication is applied in two partial quantities as specified in table 10:

1. Apply the first of the oil quantities as specified in table 10 to the ball runner block.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (normal stroke)				
	Material number (not initially greased)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm^3)				
15	0.4 (2x)		Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (2x)				
25	1.0 (2x)				
30	1.1 (2x)				
35	1.2 (2x)				
45	–				
55	3.6 (2x)		–		
65	6.0 (2x)				
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	1.8 (2x)		–		

Table 10

Stroke < 2 · ball runner block length B_1 (short stroke)

- Attach two lube ports per ball runner block; one each on the left-hand **and** the right-hand side and lubricate them!

Initial lubrication is carried out twice per port using the partial amount stated in table 11:

1. Apply the first of the oil quantities as specified in table 11 to each fitting of the ball runner block.
2. Run the ball runner block with three double strokes of 3 · ball runner block length B_1.
3. Repeat steps 1 and 2 two more times.
4. Check whether you can see a film of grease on the ball guide rail.

Size	Initial lubrication (short stroke)				
	Material number (not pre-lubricated)		Material number (pre-lubricated)		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount per port (cm^3) left	right			
15	0.4 (2x)	0.4 (2x)	Pre-lubricated with Dynalub 510 before shipment		
20	0.7 (2x)	0.7 (2x)			
25	1.0 (2x)	1.0 (2x)			
30	1.1 (2x)	1.1 (2x)			
35	1.2 (2x)	1.2 (2x)			
45	–				
55	3.6 (2x)	3.6 (2x)	–		
65	6.0 (2x)	6.0 (2x)			
20/40	–		Pre-lubricated with Dynalub 510 before shipment		
25/70					
35/90	1.8 (2x)	1.8 (2x)	–		

Table 11

Lubrication

Relubrication of runner blocks

Stroke ≥ 2 · ball runner block length B_1 (normal stroke)

- If the relubrication interval according to diagram 5 or 6 has been reached, insert the relubrication amount in accordance with table 12.

Note

The necessary number of pulses is the integer quotient from the minimum relubrication amount according to table 12 and the smallest permissible piston distributor size (≙ minimum number of pulses) according to table 14.

The smallest permissible piston distributor size also depends on the mounting orientation.

The lubrication cycle results from dividing the relubrication interval by the determined number of pulses (c.f. the rating example).

Size	Relubrication (normal stroke)				
	Material number		Material number		
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73
	Partial amount (cm³)		Partial amount (cm³)		
15	0.4 (1x)		0.4 (1x)		
20	0.7 (1x)		0.7 (1x)		
25	1.0 (1x)		1.0 (1x)		
30	1.1 (1x)		1.1 (1x)		
35	1.2 (1x)		1.2 (1x)		
45	–		2.2 (1x)		
55	3.6 (1x)		–		
65	6.0 (1x)				
20/40	–		0.7 (1x)		
25/70			1.1 (1x)		
35/90	1.8 (1x)		–		

Table 12

Stroke < 2 · ball runner block length B_1 (short stroke)

- If the relubrication interval according to diagram 5 or 6 has been reached, insert the relubrication amount in accordance with table 13 **per** lube port.
- Calculate the required pulse count and lubricant cycle time in the same way as for relubrication (normal stroke).
- Per lubrication cycle, the ball runner block should be run with a double stroke of 3 · ball runner block length B_1; however, the minimum stroke must be ball runner block length B_1.

⚠ Pay attention to the notes on lubrication!

Size	Relubrication (short stroke)					
	Material number		Material number			
	R16.. ... 10 R16.. ... 11 R16.. ... 60	R20.. ... 04/0Z R20.. ... 05 R20.. ... 06/0Y R20.. ... 07	R16.. ... 20/2Z R16.. ... 21 R16.. ... 22/2Y R16.. ... 23	R20.. ... 30/3Z R20.. ... 31 R20.. ... 32/3Y R20.. ... 33 R20.. ... 90	R16.. ... 70/7Z R16.. ... 71 R16.. ... 72/7Y R16.. ... 73	
	Partial amount per port (cm³)		Partial amount per port (cm³)			
	left	right	left	right		
15	0.4 (1x)	0.4 (1x)	0.4 (1x)	0.4 (1x)		
20	0.7 (1x)	0.7 (1x)	0.7 (1x)	0.7 (1x)		
25	1.0 (1x)	1.0 (1x)	1.0 (1x)	1.0 (1x)		
30	1.1 (1x)	1.1 (1x)	1.1 (1x)	1.1 (1x)		
35	1.2 (1x)	1.2 (1x)	1.2 (1x)	1.2 (1x)		
45	–		2.2 (1x)	2.2 (1x)		
55	3.6 (1x)	3.6 (1x)	–			
65	6.0 (1x)	6.0 (1x)				
20/40	–		0.7 (1x)	0.7 (1x)		
25/70			1.1 (1x)	1.1 (1x)		
35/90	1.8 (1x)	1.8 (1x)	–			

Table 13

Oil lubrication via single-line piston distributor systems (continued)

Load-dependent relubrication intervals for oil lubrication via single-line piston distributor systems (“dry axes”)

The following conditions apply:

- Shell Tonna S3 M220 lubricant oil
- No exposure to metalworking fluids
- Standard seals (SS)
- Ambient temperature:
  T = 20 – 30 °C

Key

C	= Dynamic load capacity	(N)
F_{comb}	= Dynamically combined equivalent load	(N)
F_{comb}/C	= Load ratio	(–)
s	= Relubrication interval as running distance	(km)

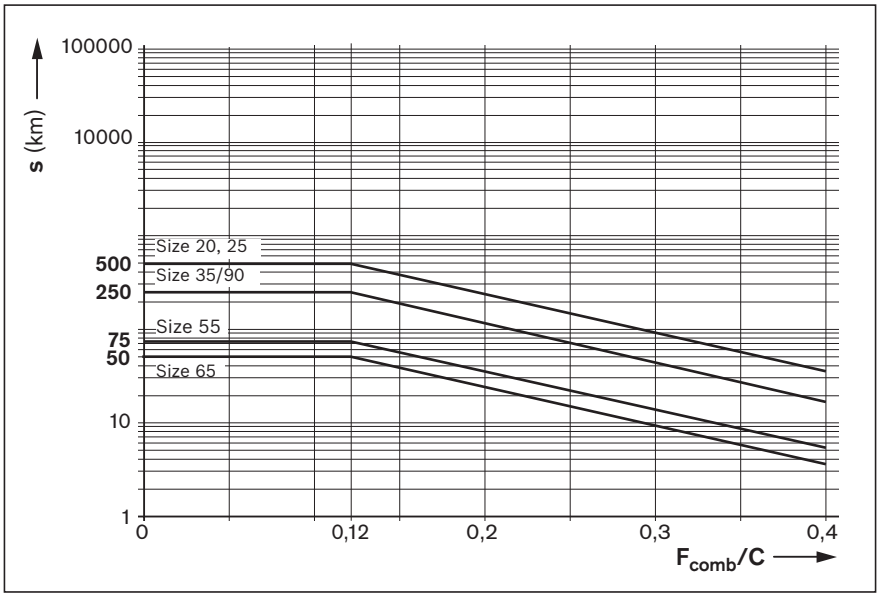
Definition of F_{comb}/C

The load ratio F_{comb}/C describes the ratio of the dynamic equivalent load with combined load on the bearing F_{comb} (taking into account the internal pre-tensioning force F_{pr}) and the dynamic load capacity C.

Please consult us regarding the relubrication intervals in the following cases:

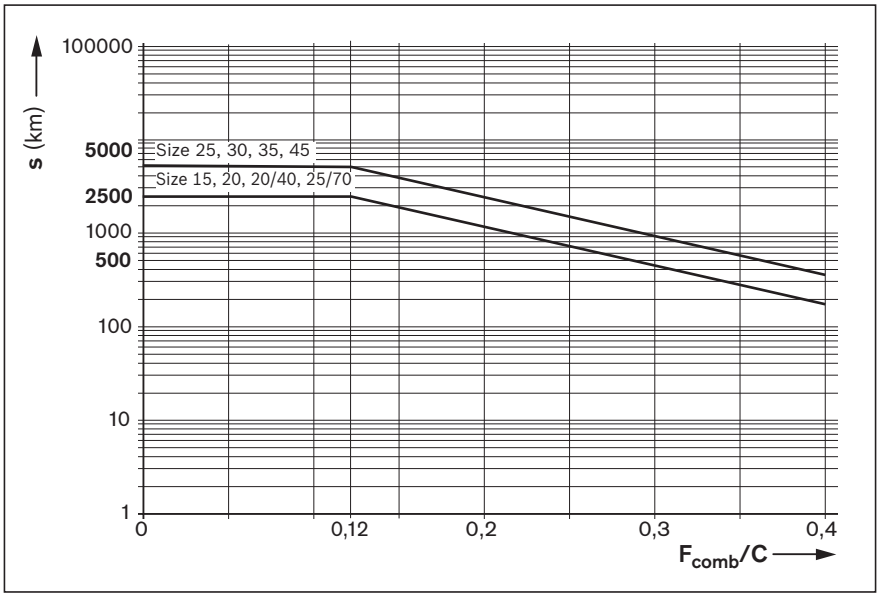
- exposure to metalworking fluids
- with dust coverage (wood, paper, etc.)
- use of double-lipped seals (DS)
- use of standard seals (SS) in combination with end seals or FKM seals or seal kits

⚠ Pay attention to the notes on lubrication!



Graph 5

Material number		
R16.. ... 10	**R16.. ... 11**	**R16.. ... 60**



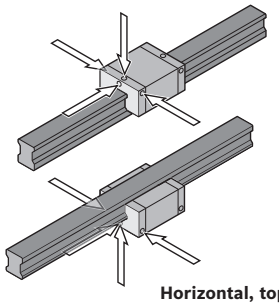
Graph 6

Material number				
R20.. ... 04	**R16.. ... 20**	**R20.. ... 30**	**R16.. ... 70**	**R20.. ... 90**
R20.. ... 05	**R16.. ... 21**	**R20.. ... 31**	**R16.. ... 71**	
R20.. ... 06	**R16.. ... 22**	**R20.. ... 32**	**R16.. ... 72**	
R20.. ... 07	**R16.. ... 23**	**R20.. ... 33**	**R16.. ... 73**	

Lubrication

Mounting orientation I – normal stroke

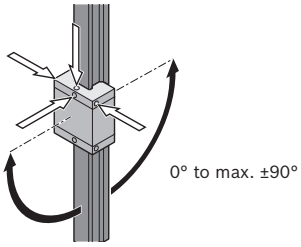
Horizontal
1 lube port can be used on a ball bearing guide on the left **or** on the right



Horizontal, top-down
Same port

Mounting orientation II – normal stroke

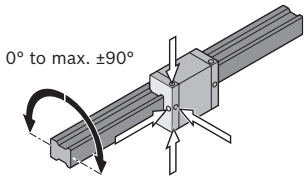
Vertical to inclined horizontal
1 lube port at top end cap



Vertical to inclined horizontal, top-down
Same port

Mounting orientation III – normal stroke

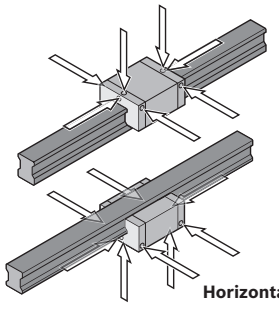
Wall mounting
1 lube port can be used on a ball bearing guide on the left **or** on the right



Same port

Mounting orientation IV – short stroke

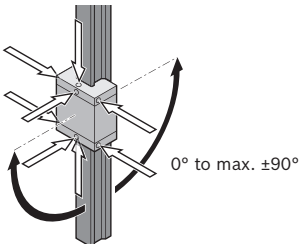
Horizontal
2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



Horizontal, top-down
Same ports

Mounting orientation V – short stroke

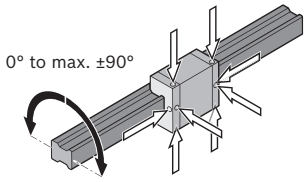
Vertical to inclined horizontal
2 lube ports with one port each on the top ball bearing guide **and** on the bottom one



Vertical to inclined horizontal, top-down
Same ports

Mounting orientation VI – short stroke

Wall mounting
2 lube ports with one port each on the left-hand ball bearing guide **and** on the right-hand one



Same ports

Smallest permissible piston distributor sizes for oil lubrication via single-line consumption lubrication systems[1)]

Ball runner block					Smallest permissible piston distributor size (≙ minimum number of pulses) per port (cm^3) with oil viscosity 220 m^2/s										
					Size										
Material number				Part number	15	20	25	30	35	45	55	65	20/40	25/70	35/90
R16.. ... 10 R16.. ... 11 R16.. ... 60				Horizontal I, IV Vertical II, V Wall mount. III, VI	–	0.60		–			1.50		–		0.60
R20.. ... 04	R16.. ... 20	R20.. ... 30	R16.. ... 70	Horizontal I, IV	0.03	0.03	0.03	0.06	0.10	0.10	–		0.03	0.03	–
R20.. ... 0Z	R16.. ... 2Z	R20.. ... 3Z	R16.. ... 7Z	Vertical II, V											
R20.. ... 05	R16.. ... 21	R20.. ... 31	R16.. ... 71	Wall mount. III, VI		0.06	0.06	0.10	0.16	0.16			0.06	0.06	
R20.. ... 06	R16.. ... 22	R20.. ... 32	R16.. ... 72												
R20.. ... 0Y	R16.. ... 2Y	R20.. ... 3Y	R16.. ... 7Y												
R20.. ... 07	R16.. ... 23	R20.. ... 33	R16.. ... 73												
		R20.. ... 90													

Table 14

1) The following conditions apply:
- Fluid grease Shell Tonna S3 M 220 and piston distributor made by SKF
- Lubrication channels must be filled
- Ambient temperature T = 20 – 30 °C

Design example for lubrication of a typical 2-axis application with centralized lubrication
X-axis

Component or parameter	Given data
Ball runner block	Size 35; 4 pcs.; C = 51,800 N; Material numbers: R1651 323 20
Ball guide rail	Size 35; 2 rails; L = 1,500 mm; part numbers: R1605 333 61
Combined equivalent dynamic load on bearing	F_{comb} = 12,570 N (per ball runner block) considering the preload (here C2)
Stroke	500 mm
Average linear speed	v_m = 1 m/s
Temperature	20 – 30 °C
Mounting orientation	Horizontal
Lubrication	Single-line centralized lubrication system for all axes with liquid grease Dynalub 520
Exposure to contaminants	No exposure to fluids, chips, dust

Design variables	**Design input (per runner block)**	**Information sources**
1. Normal or short-stroke?	Normal stroke: Stroke ≥ 2 · ball runner block length B_1 500 mm ≥ 2 · 77 mm 500 mm ≥ 154 mm! i.e. normal stroke applicable!	▶ Normal stroke formula, ball runner block length B_1
2. Initial lubrication quantity	1 lube port, initial lubrication quantity: pre-lubricated with Dynalub 510 before shipment	▶ Initial lubrication amount from table 5
3. Relubrication quantity	1 lube port, relubrication quantity: 2.2 cm^3 (2x)	▶ Relubrication amount from table 7
4. Mounting orientation	Mounting orientation 1 – normal stroke (horizontal)	▶ Installation position from overview
5. Piston distributor size	Permissible piston distributor size: 0.1 cm^3	▶ Piston distributor size from table 9 size 35, installation position I (horizontal)
6. Number of pulses	Number of pulses = $\frac{2 \cdot 2.2\ cm^3}{0.1\ cm^3}$ = 44	▶ Number of pulses = $\frac{\text{Quantity} \cdot \text{relubrication amount}}{\text{perm. piston distributor size}}$
7. Load ratio	Load ratio = $\frac{12{,}570\ N}{51{,}800\ N}$ = 0.24	▶ Load ratio = F_{comb}/C F_{comb} and C from specifications
8. relubrication interval	Relubrication interval: 2,150 km	▶ Relubrication interval from diagram 4: Curve size 35 at load ratio 0.24
9. Lubrication cycle	Lube cycle = $\frac{2{,}150\ km}{44}$ = 48 km	▶ Lube cycle = $\frac{\text{relubrication interval}}{\text{Number of pulses}}$
Interim result (X-axis)	With the X-axis, you must insert a minimum amount of 0.1 cm^3 Dynalub 520 per ball runner block every 48 km.	

Y-axis

Component or parameter	Given data
Ball runner block	Size 25; 4 pcs.; C = 28,600 N; Material numbers: R1651 223 20
Ball guide rail	Size 25; 2 rails; L = 1,000 mm; part numbers: R1605 232 31
Combined equivalent dynamic load on bearing	F_{comb} = 3,420 N (per ball runner block) considering the preload (here C2)
Stroke	50 mm (short stroke)
Average linear speed	v_m = 1 m/s
Temperature	20 – 30 °C
Mounting orientation	Vertical
Lubrication	Single-line centralized lubrication system for all axes with liquid grease Dynalub 520
Exposure to contaminants	No exposure to fluids, chips, dust

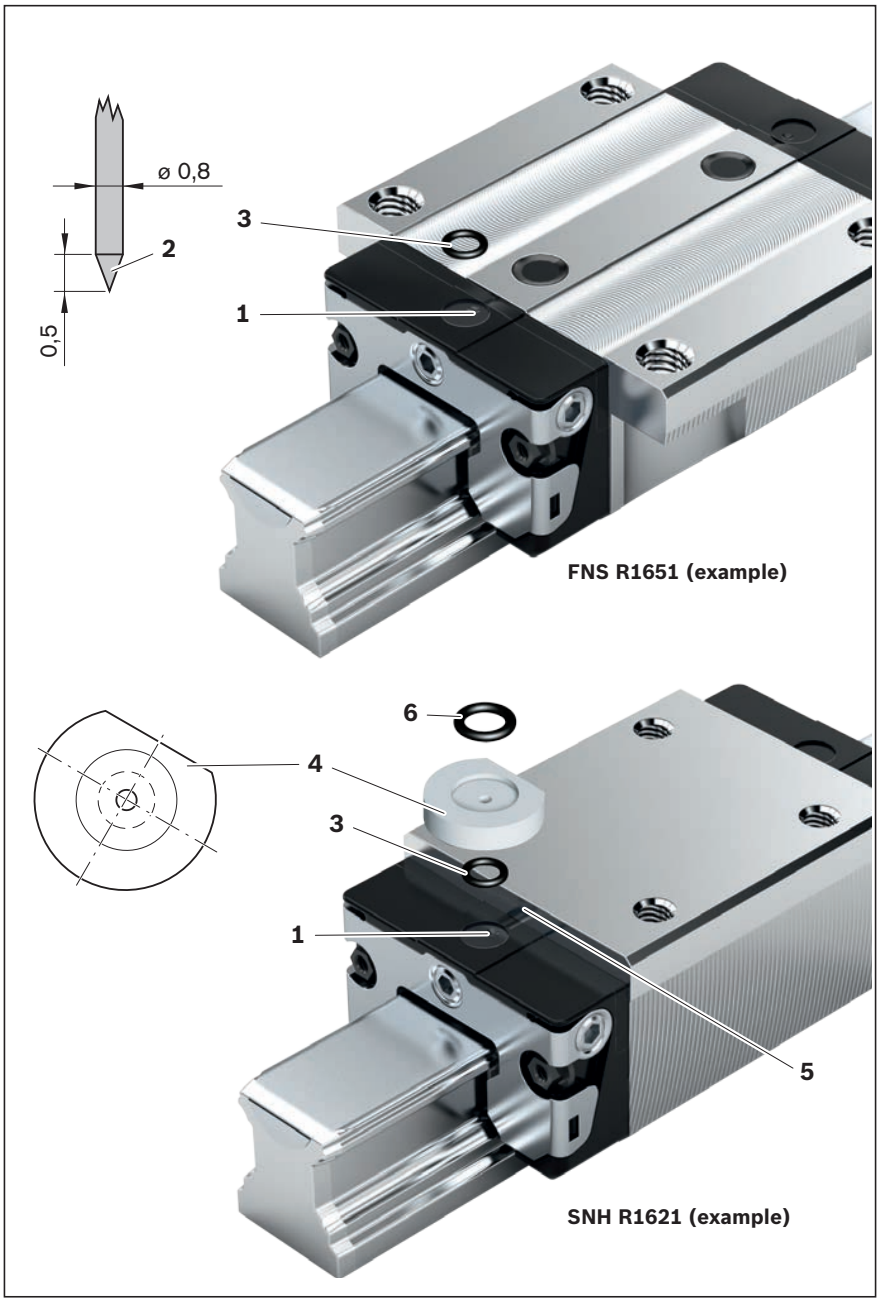
Design variables	Design input (per runner block)	Information sources
1. Normal or short-stroke?	Normal stroke: Stroke ≥ 2 · ball runner block length B_1 50 mm ≥ 2 · 57.8 mm 50 mm < 115.6 mm! i.e. short stroke applicable!	▶ Normal stroke formula, ball runner block length B_1
2. Initial lubrication quantity	2 lube ports, initial lubrication quantity per lube port: pre-lubricated with Dynalub 510 before shipment	▶ Initial lubrication amount from table 6
3. Relubrication quantity	2 lube ports, relubrication quantity per port: 1.4 cm^3 (2x)	▶ Relubrication amount from table 8
4. Mounting orientation	Mounting orientation V – short stroke (vertical to inclined horizontal)	▶ Installation position from overview
5. Piston distributor size	Permissible piston distributor size: 0.03 cm^3	▶ Piston distributor size from table 9 size 25, installation position V (vertical to inclined horizontal)
6. Number of pulses	Pulse count = $\frac{2 \cdot 1.4\ cm^3}{0.03\ cm^3} = 94$	▶ Number of pulses = $\frac{\text{Quantity} \cdot \text{relubrication amount}}{\text{perm. piston distributor size}}$
7. Load ratio	Load ratio = $\frac{3{,}420\ N}{28{,}600\ N} = 0.12$	▶ Load ratio = F_{comb}/C F_{comb} and C from specifications
8. relubrication interval	Relubrication interval: 7,500 km	▶ Relubrication interval from diagram 4: Curve size 25 at load ratio 0.12
9. Lubrication cycle	Lube cycle = $\frac{7{,}500\ km}{94} = 80\ km$	▶ Lube cycle = $\frac{\text{relubrication interval}}{\text{Number of pulses}}$
Interim result (Y-axis)	With the Y-axis, you must insert a minimum amount of 0.03 cm^3 Dynalub 520 per ball runner block and lube port every 80 km.	
Final result (two-axis lubrication)	Since both axes are to be supplied by a single-line consumption lubrication system in this example, the X-axis with its lower lubrication cycle of 48 km determines the overall cycle, i.e. the Y-axis is also lubricated every 48 km.	**The number of ports and the minimum lubricant quantities determined for each axis remain the same.**

Lubrication from above, lubrication from above without lubrication adapter
For all ball runner blocks prepared for lubrication from above.
(Exceptions: high ball runner blocks SNH R1621 and SLH R1624)
In the O-ring recess there is a further pre-formed small recess (1).
Do not drill it open.
Risk of contamination!

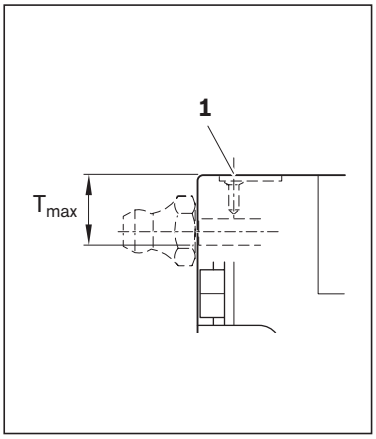
1. Heat up a pointed metal punch (2) with diameter of 0.8 mm.
2. Use the metal spike to carefully open the recess (1) and pierce it.
   Pay attention to the maximum permissible depth T_{max} stated in the table!
3. Insert the O-ring (3) into the recess (the O-ring is not supplied with the ball runner block.
   Ball runner block accessory)

Lubrication from above with lube adapter
(Ball runner block accessory)
A lube adapter is needed for high runner blocks, if lubrication is to be performed through the carriage.
In the O-ring recess there is a further pre-formed small recess (1).
Do not drill it open.
Risk of contamination!

1. Heat up a pointed metal punch (2) with diameter of 0.8 mm.
2. Use the metal spike to carefully open the recess (1) and pierce it.
   Pay attention to the maximum permissible depth T_{max} stated in the table!
3. Insert O-ring (3) in the recess (O-ring is supplied with the lube adapter).
4. Insert the lube adapter at a slant into the recess and press the straight side (4) against the steel part (5). Use grease to fix the adapter in place.
5. Place O-ring (6) in the lube adapter (O-ring is supplied with the lube adapter).



Size	Lubrication opening at top: Maximum permissible depth for piercing T_{max} (mm)	
	Ball runner block standard height/high	Ball runner block low profile
15	3.6	–
20	3.9	4.4
25	3.3	4.9
30	6.6	–
35	7.5	–
45	8.8	–
20/40	4.0	–
25/70	2.1	–
35/90	7.9	–



Maintenance

Cleaning cycle

Dirt can settle and encrust on guide rails, especially when these are not enclosed.
To ensure that seals and cover strips retain their functionality, this dirt must be removed at regular intervals.
It is advisable to perform at least one full cleaning cycle over the entire installed rail length at least twice a day, but at the latest every 8 hours.
Before shutting down the machine, always perform a cleaning cycle.
Shorten the maintenance intervals for systems exposed to metalworking fluids.

Checking accessories

All accessories used for scraping or wiping the guide rails must be checked at regular intervals.

In environments with heavy contamination, it is advisable to replace all the parts directly exposed to such contamination.

We recommend checking the accessories at least once a year.